Kramer Electronics, Ltd.

USER MANUAL

Models:

621T, ***DVI Optical Transmitter***

621R, ***DVI Optical Receiver***

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1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 1,000-plus different models now appear in 11 groups[1] that are clearly defined by function. Thanks for purchasing your Kramer **621T** *DVI Optical Transmitter* and **621R** *DVI Optical Receiver*, which are ideal for:

- Digital display systems
- Flat panel displays, plasma display panels and projectors in conference rooms and auditoriums
- Kiosks with digital flat panel displays for information display

The **621T** and **621R** are available as two separate packages. The **621T** package includes the following items:

- **621T** *DVI Optical Transmitter*
- Power adapter (12V DC 500mA Input)[2] and this user manual[3]

The **621R** package includes the following items:

- **621R** *DVI Optical Receiver*
- Power adapter (12V DC 1.25A Input)[2] and this user manual[3]
- One DVI/DVI male-to-male cable

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use Kramer high performance optical cables[4]. Note that the units are designed for use with **MULTI-MODE** optical cables

1 GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Matrix Switchers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters; GROUP 11: Sierra Products

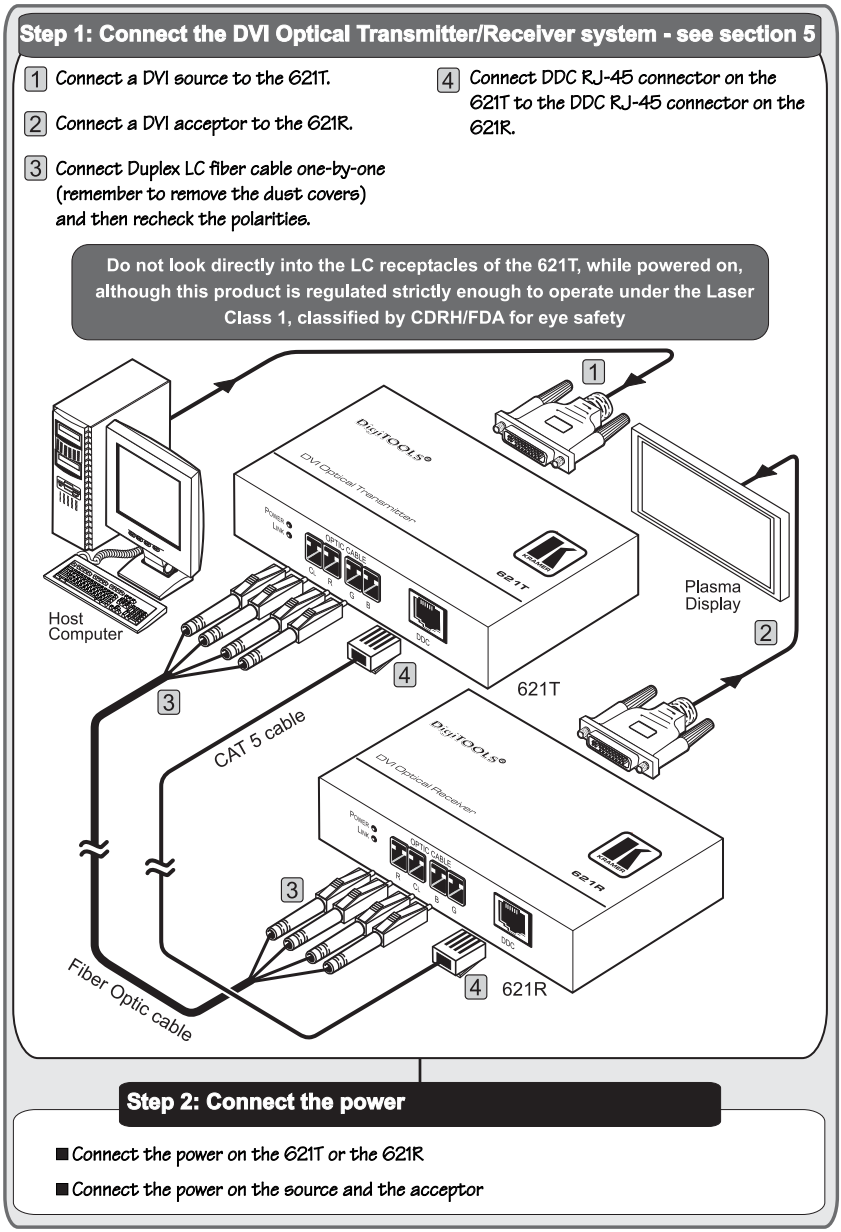
2 When setting up a transmitter / receiver system you can connect the 12V power supplies to the transmitter and to the receiver simultaneously. However, the power connect feature does let you connect just *one* power supply to either the transmitter or receiver. In such a case, use the 1.25A power supply

3 Download up-to-date Kramer user manuals from the Internet at this URL: http://www.kramerelectronics.com

4 The complete list of Kramer cables is on our Web site at http://www.kramerelectronics.com

2.1 Quick Start

This quick start chart summarizes the basic setup and operation:


Step 1: Connect the DVI Optical Transmitter/Receiver system - see section 5
1 Connect a DVI source to the 621T.
2 Connect a DVI acceptor to the 621R.
3 Connect Duplex LC fiber cable one-by-one (remember to remove the dust covers) and then recheck the polarities.
4 Connect DDC RJ-45 connector on the 621T to the DDC RJ-45 connector on the 621R.
Do not look directly into the LC receptacles of the 621T, while powered on, although this product is regulated strictly enough to operate under the Laser Class 1, classified by CDRH/FDA for eye safety
Host Computer
Plasma Display
621T
CAT 5 cable
Fiber Optic cable
621R
Step 2: Connect the power
Connect the power on the 621T or the 621R
Connect the power on the source and the acceptor

3 Overview

The high performance Kramer **621T** and **621R** are optical transmitter and receivers for DVI signals for computer resolutions of up to 1920x1200 at 60Hz and HDTV resolutions of up to 1080p at 60Hz. The **621T** converts a DVI signal into an optical signal and the **621R** converts the optical signal back to DVI.

The **621T** and **621R** have a transmission range of more than 300 ft. (more than 100 meters) of single link high-resolution digital graphic data over fiber optic cables, and EDID[1]/HDCP[2] parameters over DDC[3] (UTP) cabling.

In particular, the **621T**/**621R** pair:

- Provides a single-link DVI connection, supporting a resolution of up to 1920x1200 at 60Hz refresh rate
- Supports up to 1.65Gbps bandwidth
- Transmits one red, one green and one blue channel, and one clock – over the fiber optic cables, with 4 simplex or 2 duplex LC fiber connectors
- Performs DDC/HDCP[2] interconnection over CAT5 with RJ-45 connectors, and also provides power via the UTP cable
- Is strictly regulated under the Class 1 Laser Eye Safety in compliance with FDA/CDRH and IEC 60825-1
- Complies with the limits for a Class A digital device, pursuant to part 15 and 2 of FCC and CE
- Does not require any special memory size, CPU speed and chipsets, when using a computer
- Is HDTV compatible

To achieve the best performance:

- Connect only good quality connection cables, thus avoiding interference, deterioration in signal quality due to poor matching, and elevated noise-levels (often associated with low quality cables)
- Avoid interference from neighboring electrical appliances and position your Kramer **621R** and **621T** away from moisture, excessive sunlight and dust

1 Extended Display Identification Data

2 High-Bandwidth Digital Content Protection

3 Using DDC (Digital Display Channel), the display can inform the video card about its properties, such as the maximum resolution and the color depth. The video card can then use this information to ensure that you are presented with valid options for configuring the display

3.1 Power Connect Feature

When setting up a transmitter / receiver system you can connect the 12V power supplies to the transmitter and to the receiver simultaneously. However, the Power Connect feature does let you connect just *one* power supply to either the transmitter or receiver. The other unit is fed over the same CAT 5 cable. In such a case, use the 1.25A power supply.

The Power Connect feature applies as long as the CAT 5 cable is heavy gauge cable (that is, it can carry power). The distance does not exceed 50 meters on standard cable.

For a distance of 100 meters, separate power supplies must be connected to the transmitter and to the receiver simultaneously, unless using heavy gauge CAT 5 cable.

3.2 Shielded Twisted Pair (STP) / Unshielded Twisted Pair (UTP)

We recommend that you use shielded twisted pair (STP) cable. There are different levels of STP cable available, and we advise you to use the best quality STP cable that you can afford. Our non-skew-free cable, Kramer **BC-STP** is intended for digital signals and for analog signals where skewing is not an issue. For cases where there is skewing, our UTP skew-free cable, Kramer **BC-XTP**, may be used. Bear in mind, though, that we advise using STP cables where possible, since the compliance to electromagnetic interference was tested using those cables.

Although unshielded twisted pair (UTP) cable might be preferred for long range applications, the UTP cable should be installed far away from electric cables, motors and so on, which are prone to create electrical interference. However, since the use of UTP cable might cause inconformity to electromagnetic standards, Kramer does not commit to meeting the standard with UTP cable.

4 Your DVI Optical Transmitter/ Receiver

This section defines the DVI Optical Transmitter / Receiver:

- **621T** *DVI Optical Transmitter* (see section 4.1)
- **621R** *DVI Optical Receiver* (see section 4.2)

4.1 Your 621T DVI Optical Transmitter

Figure 1, Figure 2 and Table 1 define the **621T** *DVI Optical Transmitter*:

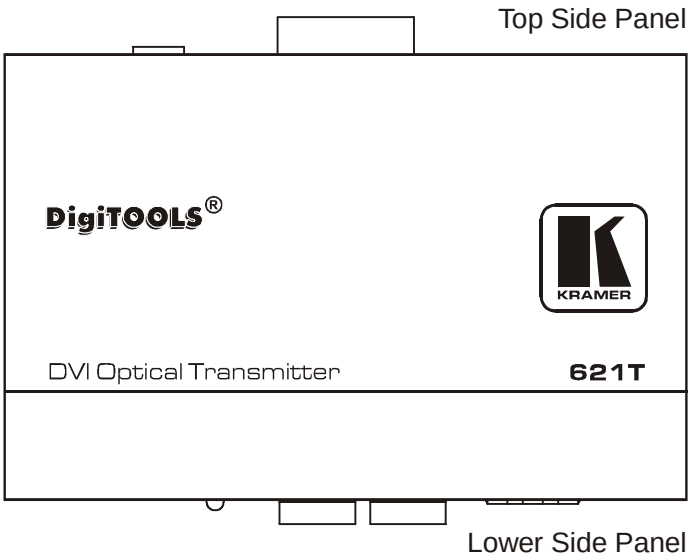


Figure 1: 621T DVI Optical Transmitter

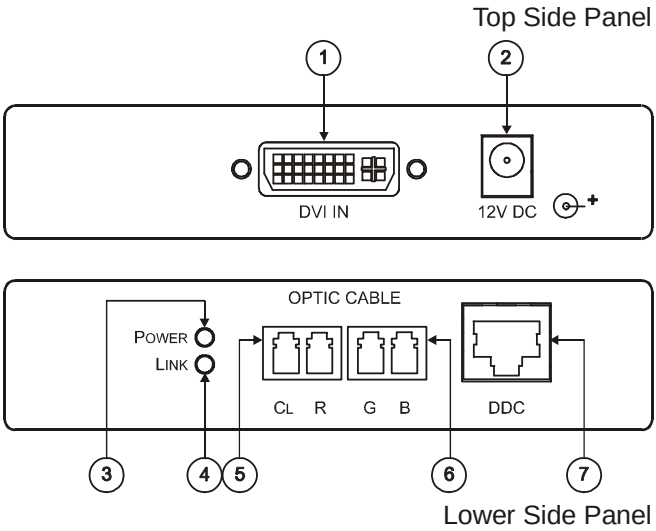


Figure 2: 621T DVI Optical Transmitter – Top and Lower Side Panels

Table 1: 621T DVI Optical Transmitter Features

#	Feature		Function
1	*DVI IN* Connector		Connects to the DVI source
2	*12V DC*		12V DC connector for powering the unit
3	*POWER* LED		Lights when receiving power
4	*LINK* LED		Lights when receiving a stable DVI signal
5	Optic Cables	CL R	Connect to the optic connectors on the **621R**
6		G B	
7	*DDC* CAT5 Connector		Connects[1] to the *DDC* RJ-45 connector on the **621R**

4.2 Your 621R DVI Optical Receiver

Figure 3, Figure 4 and Table 2 define the **621R** *DVI Optical Receiver*:

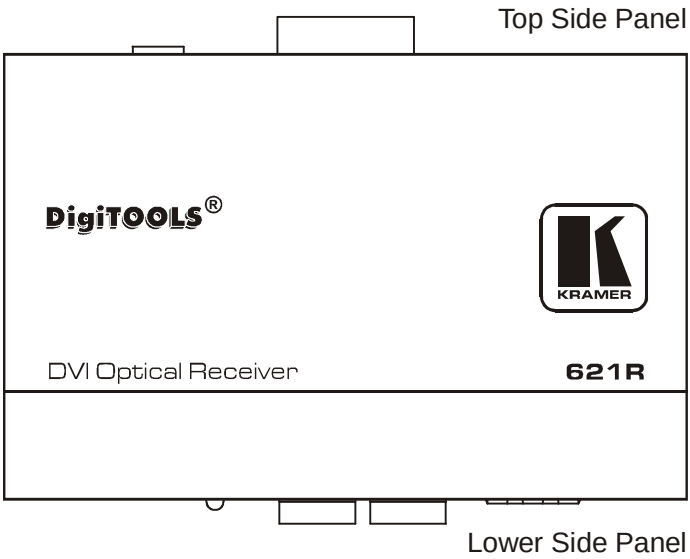


Figure 3: 621T DVI Optical Receiver

1 Using a UTP CAT5 cable with RJ-45 connectors at both ends (the PINOUT is defined in Table 3 and Figure 7)

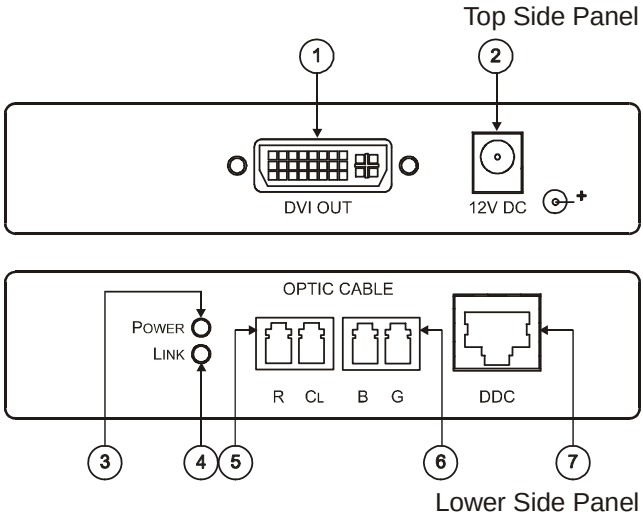


Figure 4: 621R DVI Optical Receiver – Top and Lower Side Panels

Table 2: 621R DVI Optical Receiver Features

#	Feature		Function
1	*DVI OUT* Connector		Connects to the DVI Acceptor
2	*12V DC*		12V DC connector for powering the unit
3	*POWER* LED		Lights when receiving power
4	*LINK* LED		Lights when receiving the correct input signal
5	Optic Cables	R CL	Connect to the optic connectors on the **621T**
6		B G	
7	*DDC* CAT5 Connector		Connects[1] to the *DDC* RJ-45 connector on the **621T**

1 Using a UTP CAT5 cable with RJ-45 connectors at both ends (the PINOUT is defined in Table 3 and Figure 7)

5 Using the DVI Optical Transmitter/Receiver

You can use the **621T** and **621R** to configure a DVI optical transmitter and receiver system as illustrated in Figure 5: the source connects to the **621T**, the **621R** connects to the display, and both transmitter and receiver are interconnected via fiber optics and UTP cabling.

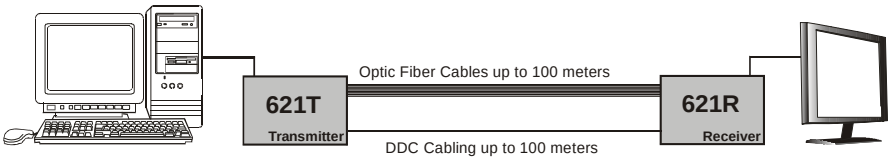


Figure 5: 621T and 621R DVI Optical Transmitter and Receiver System

It is recommended to test your system configuration by first connecting the entire system (as illustrated in Figure 5), using short copper cables instead of optical fiber cables

5.1 Connecting the 621T/621R DVI Optical Transmitter/Receiver

To connect[1] the **621T** *DVI Optical Transmitter* with the **621R** *DVI Optical Receiver*, as the example in Figure 6 illustrates, do the following:

1. Connect the DVI source (for example, a set top box[2]) to the **621T** DVI IN connector, using the DVI cable.
   Make sure that the system is not powered up when connecting the DVI source.
2. On the **621R**, connect the DVI OUT connector to the DVI acceptor (for example, a display), using the DVI cable.
3. Remove the module dust covers and connect each duplex LC fiber cable one-by-one to each of the four LC receptacles of the **621T** and **621R**.
4. Carefully recheck the polarities and ensure that the duplex connectors are fully engaged.

Do not look directly into the LC receptacles of the **621T**, while powered on, although this product is regulated strictly enough to operate under the Laser Class 1, classified by CDRH/FDA for eye safety

1 Switch OFF the power on each device before connecting it to your 621T and 621R. After connecting your 621T and 621R, switch on its power and then switch on the power on each device

2 Alternatively, you could connect a computer or other DVI source

5. Connect the DDC RJ-45C connector on the **621T** to the DDC RJ-45C connector on the **621R**, via UTP cabling (see section 5.3).
6. Connect the 12V 2.1A DC power adapter to the power socket of either the **621T** or[1] the **621R** and connect the adapter to the mains electricity (not shown).
7. Turn the power on the source and the display to ON.

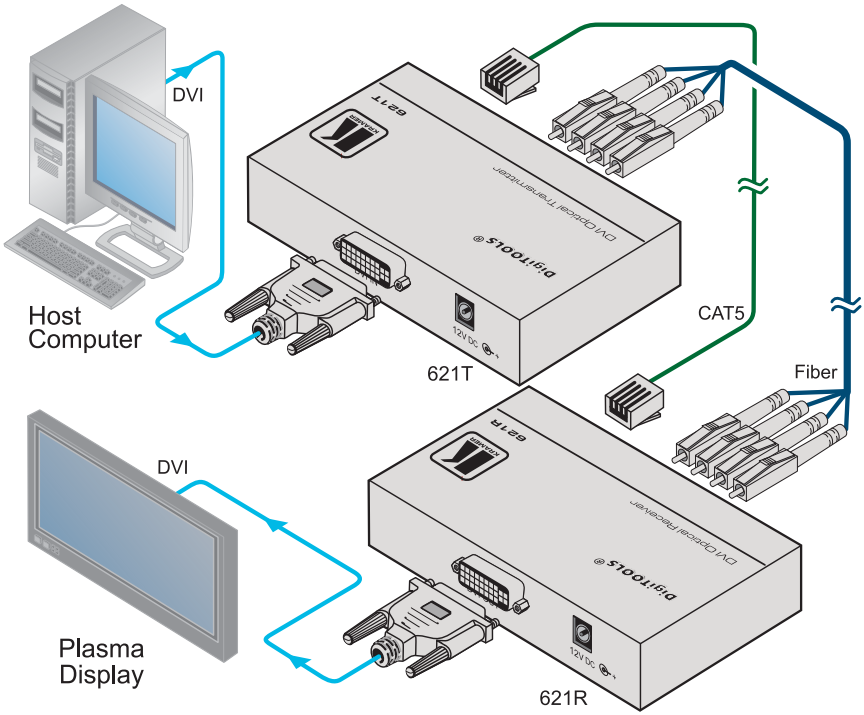


Figure 6: Connecting the 621T/621R DVI Optical Transmitter/Receiver

5.2 Operating the 621T/621R DVI Optical Transmitter/Receiver

To properly operate the **621T**/**621R** system:

- Make sure you have a media receiver or a graphic controller card with a DVI connector on your PC/Mac or SUN system.
- Make sure that your graphic card supports the maximum resolution of the display you are about to connect
- Avoid "hot plugging" the **621T** or **621R**. This is not a recommended practice with live digital voltages

1 Alternatively, connect the separate power supplies to the transmitter and to the receiver simultaneously

5.3 Wiring the CAT 5 LINE IN / LINE OUT RJ-45 Connectors

Table 3, Table 4 and Figure 7 define the CAT 5 PINOUT, using a straight pin-to-pin cable with RJ-45 connectors:

Figure 7: CAT 5 PINOUT

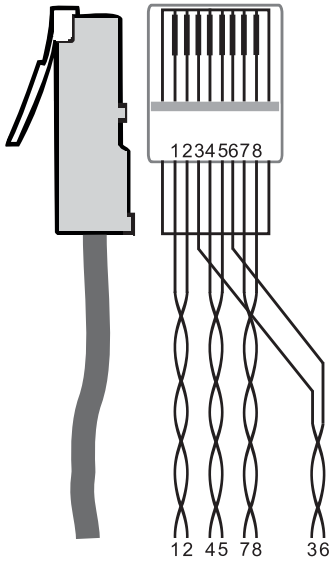


Table 3: CAT 5 PINOUT

EIA /TIA 568A	
PIN	**Wire Color**
1	Green / White
2	Green
3	Orange / White
4	Blue
5	Blue / White
6	Orange
7	Brown / White
8	Brown
Pair 1	4 and 5
Pair 2	3 and 6
Pair 3	1 and 2
Pair 4	7 and 8

EIA /TIA 568B	
PIN	**Wire Color**
1	Orange / White
2	Orange
3	Green / White
4	Blue
5	Blue / White
6	Green
7	Brown / White
8	Brown
Pair 1	4 and 5
Pair 2	1 and 2
Pair 3	3 and 6
Pair 4	7 and 8

Table 4: CAT 5 Power PINOUT

PIN	Symbol	Description
1	DDC Data GND	DDC Data line return ground
2	DDC Data	DDC Data line for (HDMI Digital Display Channel) DDC2B communication
3	DDC Clock GND	DDC Clock line return ground
4	Power GND	Main power return ground
5	Power	Main power for Kramer module
6	DDC Clock	DDC Clock line for (HDMI Digital Display Channel) DDC2B communication
7	5V_IN	DVI 5V (DVI No. 14 pin for Display)
8	HPD	Signal is driven by monitor to enable the system to identify the presence of a Display

6 Technical Specifications

Table 5 includes the technical specifications:

Table 5: Technical Specifications[1] of the 621T/621R

	621T	**621R**
INPUTS:	DVI IN (DVI-D on a DVI-I connector)	4 LC optical connectors for R, G, B & clock. 1 CAT 5 (RJ-45) for DDC and HDCP bi-directional data
OUTPUTS:	4 LC optical connectors for R, G, B & Clock. 1 CAT 5 (RJ-45) for DDC and HDCP bi-directional data	DVI OUT (DVI-D on a DVI-I connector)
BANDWIDTH:	1.65Gbps	
POWER SOURCE:	12V DC 500mA	12V DC 1.25A
DIMENSIONS:	12cm x 8.05cm x 2.75cm (4.72" x 3.17" x 1.08", W, D, H)	
WEIGHT:	0.3 kg. (0.67 lbs.) approx.	
ACCESSORIES:	Power supply, bracket installation kit, 1 DVI/DVI male to male cable	
OPTIONS:	RK-3T 19” rack adapter	

1 Specifications are subject to change without notice

LIMITED WARRANTY

Kramer Electronics (hereafter *Kramer*) warrants this product free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

Labor and parts are warranted for three years from the date of the first customer purchase.

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the Web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed, or on which the WARRANTY VOID IF TAMPERED sticker has been torn, reattached, removed or otherwise interfered with.
3. Damage, deterioration or malfunction resulting from:
   i) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
   ii) Product modification, or failure to follow instructions supplied with the product
   iii) Repair or attempted repair by anyone not authorized by Kramer
   iv) Any shipment of the product (claims must be presented to the carrier)
   v) Removal or installation of the product
   vi) Any other cause, which does not relate to a product defect
   vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

This equipment has been tested to determine compliance with the requirements of:

EN-50081:	"Electromagnetic compatibility (EMC); generic emission standard. Part 1: Residential, commercial and light industry"
EN-50082:	"Electromagnetic compatibility (EMC) generic immunity standard. Part 1: Residential, commercial and light industry environment".
CFR-47:	FCC* Rules and Regulations: Part 15: “Radio frequency devices Subpart B Unintentional radiators”

CAUTION!

- Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- Use the supplied DC power supply to feed power to the machine.
- Please use recommended interconnection cables to connect the machine to other components.

* FCC and CE approved using STP cable (for twisted pair products)

For the latest information on our products and a list of Kramer distributors, visit our Web site: www.kramerelectronics.com, where updates to this user manual may be found.
We welcome your questions, comments and feedback.

Safety Warning:
Disconnect the unit from the power supply before opening/servicing.

Class 1 Laser Compliance

This product complies with "21 CFR 1040.10" and "EN 60825-1".

Kramer Electronics, Ltd.
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P/N: 2900-000103 REV 6